Changes for the Better

MITSUBISHI ELECTRIC AUTOMATION, INC.

Setup and Programming of the FX3U-16CCL-M FX3U CC-LINK Master Module

CC-Link

Quick Start Guide

START

FX3 series

R72-11Z-SLSASG-028

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Revisions 1

FURTHER READING REFERENCE LIST

Mitsubishi

FX3U-16CCL-M User's Manual JY997D43601a

FX3U-16CCL-M Hardware Manual JY997D43401 (e) b

AJ65SBT-62DA Digital-Analog Converter Module User’s Manual SH_NA_080107-D

AJ65SBT-64AD Analog-Digital Converter Module User’s Manual SH_NA_080106-F

ATTACHMENTS

Mitsubishi

FX3U-16CCL-M CC-Link Master.gwz - GX Works2 Compressed File

Chapter 1 Introduction

This Quick Start Guide (QSG) provides instructions on how to set a FX3U CC-LINK Master Module (FX3U-16CCL-M) to talk with two Remote I/O and two Analog Stations using GX Works2 Programmable Logic Controller (PLC) Software. Only Version 1 CC-Link Network Devices are shown in the QSG. If Version 2 CC-Link Network Devices are used please see the manual.

The objective of this QSG is to assist the users to quickly setup the FX3U CPU program to have the CC-LINK Master Module communicate to the CC-LINK Remote Stations. This QSG contains the necessary configuration information for the FX3U Network Setup.

Figure 1 FX3U CPU and Remote I/O Setup

Chapter 2 System Overview

This QSG was setup using the following test system. The FX3U CPU firmware must be Version 3.10 or greater for Automatic Parameter Setup. The PLC Programming software must be GX Works2 V1.73B or Greater. Melsoft Navigator was NOT used or required.

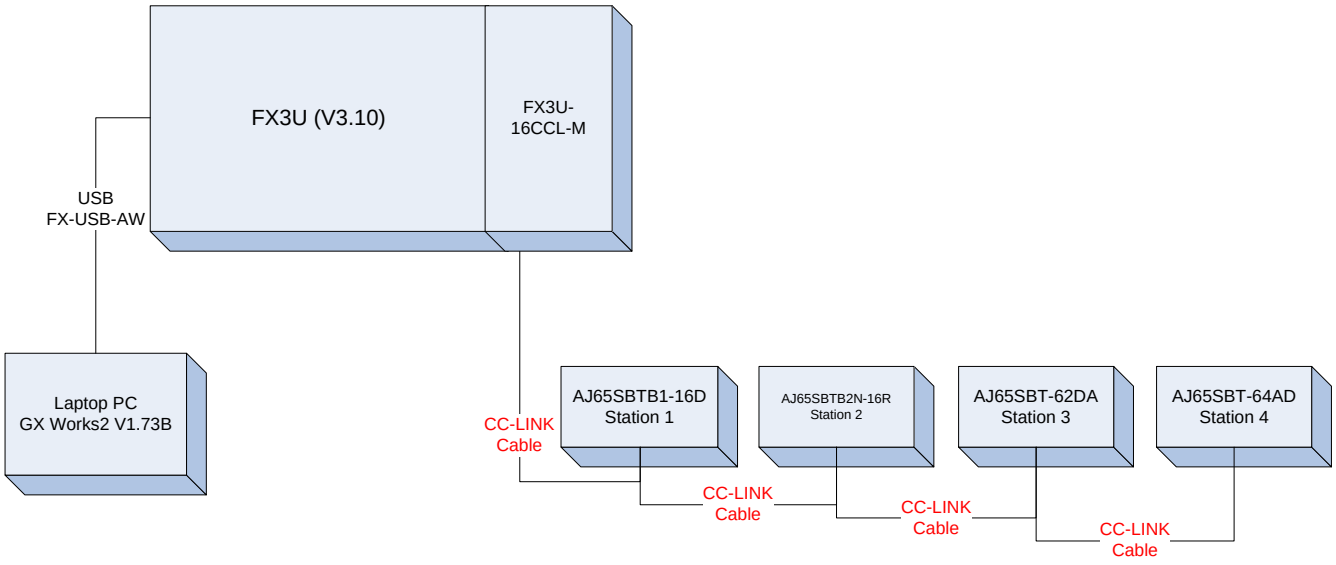


Figure 2.1 Architecture of Test System

Special Note: Differences from FX2N CC-Link Master

Item	FX3U-16CCL-M	FX2N-16CCL-M
CC-Link version	Ver.2.00 (Ver.1 supported)	Ver.1.10
Accessible devices	Remote I/O stations Remote device stations Intelligent device stations	Remote I/O stations Remote device stations
Max. number of connected stations	Remote I/O stations = 8 Remote device stations + Intelligent device stations = 8	Remote I/O stations = 7 Remote device stations = 8
Parameter setting method	Via From/To instructions Via GD2 network parameter	Via From/To instructions
CC-Link transient communication	Available	Not supported
Connectable master units per PLC	Limited to one master unit per PLC	Multiple units supported (depending on the PLC series)
Dimensions	90H×55W×87D	90H×85W×87D

Chapter 3 Wiring and Hardware Setup

3.1 Master → Remote Station CC-LINK Wiring

This this example shows the Master and two Remote Stations. This QSG has a total of four Remote Stations. Please insert the two additional stations as needed.

- Wiring simplified diagram

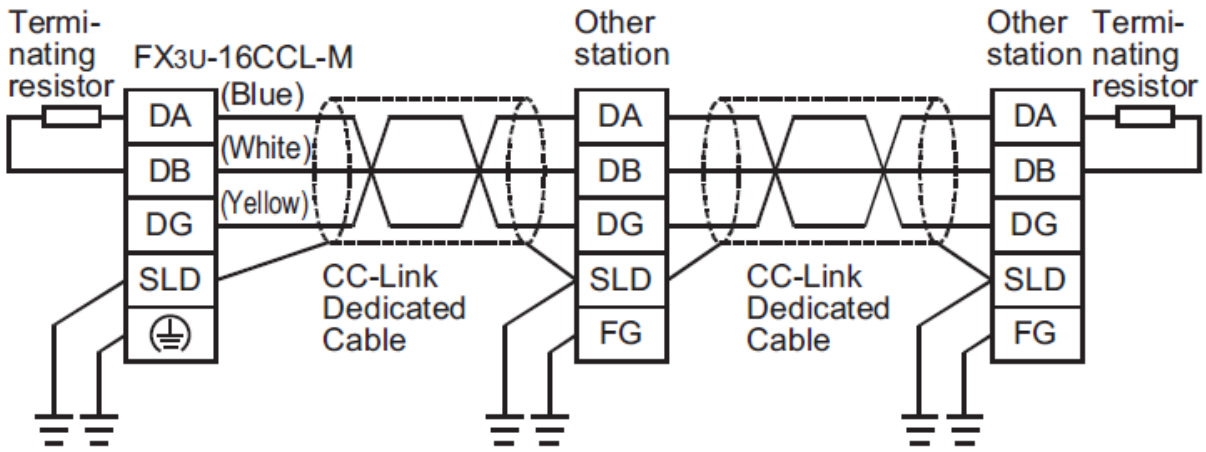


Figure 3.1 CC-LINK Wiring Diagram

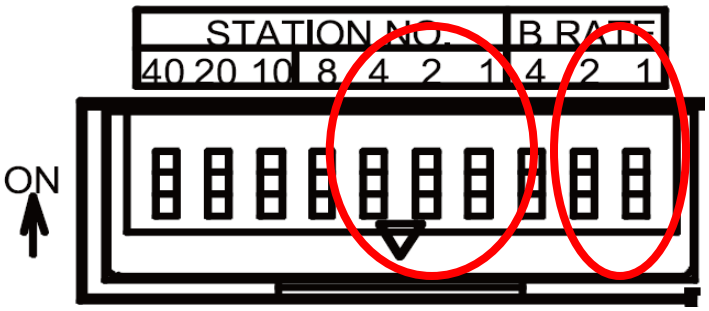
3.2 Master → Remote Station CC-LINK Switch Settings

The following chart shows the Rotary (Master) and Dip Switch Settings for each Remote Station

The Baud Rate is 5 Mbps for this network and the Master is Station# 0.

Station Part Number	B.Rate Switches ON	Station No. Switches ON
AJ65SBTB1-16D	1 and 2	1
AJ65SBTB2N-16R	1 and 2	2
AJ65SBT-62DA	1 and 2	1 and 2
AJ65SBT-64AD	1 and 2	4
FX3U (Rotary Switches)	3 = 5 Mbps	0 and 0

Figure 3.2.1 Switch Settings



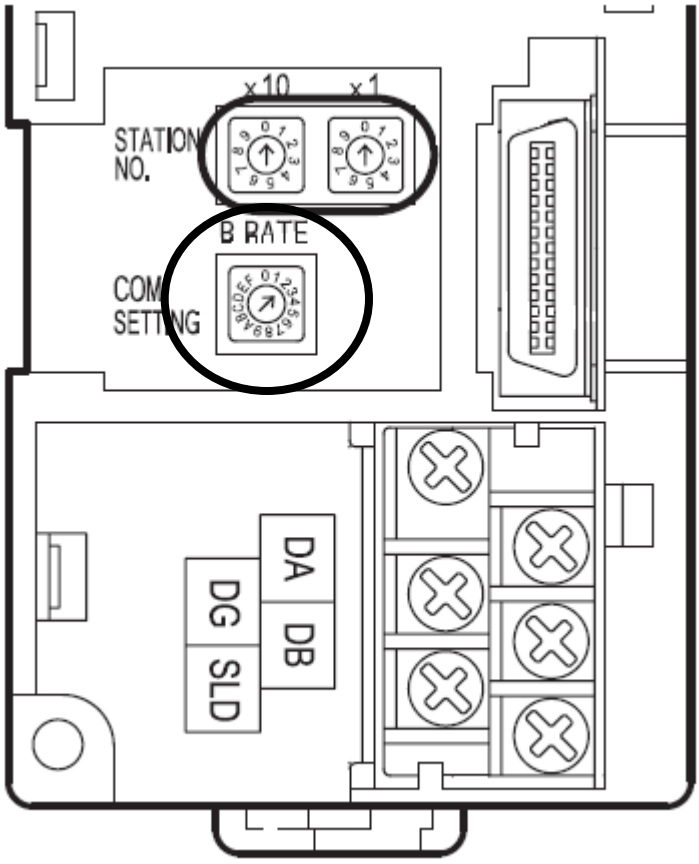


Figure 3.2.2 Switch Settings On Hardware – Upper Remote Station, Lower Master

Chapter 4 GX Works2 CC-Link Network Setup

4.1 CC-Link Network Parameters

Under the Project Manager Select Parameter → Network Parameter → CC-Link

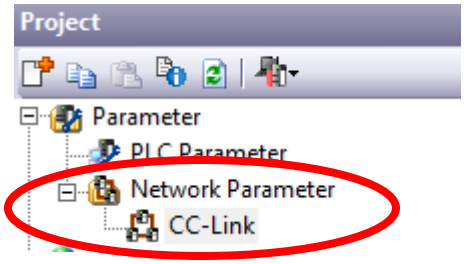


Figure 4.1 CC-Link Network Parameter Selection

The below selection will open. Set the following parameters:

- Special Block No. = 0 (SFM 0 to 7)
- Mode = Remote Net (Ver.1 Mode)
- Total Module Connected = 4

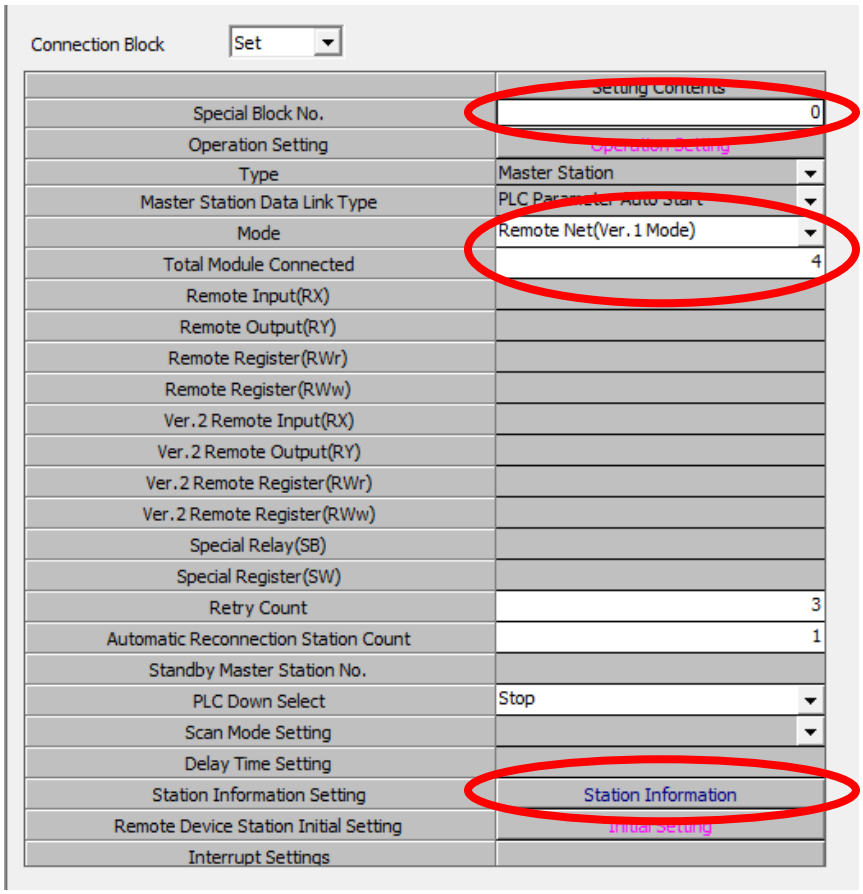


Figure 4.1.2 Network Parameters – CC-Link

Select Station Information and set the following for each Station number

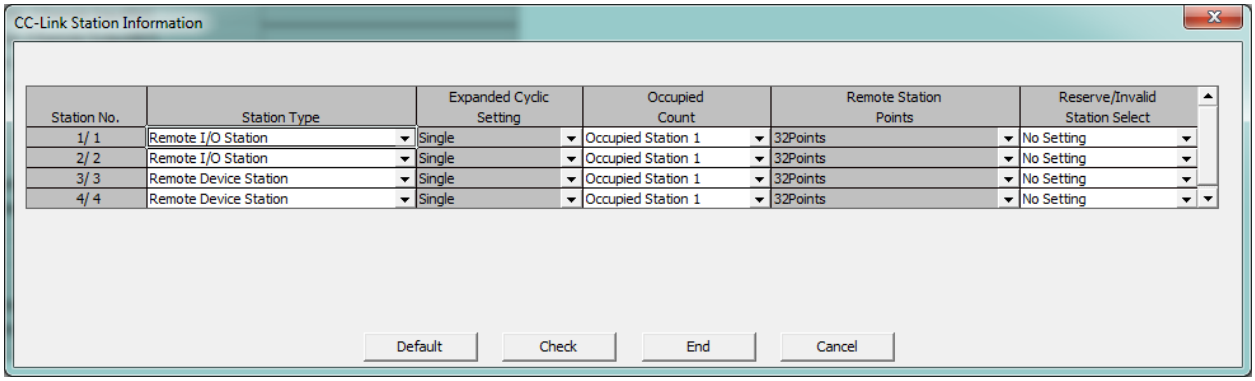


Figure 4.1.3 Station Information – CC-Link

4.2 CC-Link Remote I/O Buffer Memory Locations

The following shows the BFM locations that need to be accessed from the PLC program to Read Remote Inputs (RX) and Remote Registers (RWr) and to Write to Remote Outputs (RY) and Registers (RWw). In this QSG this is accomplished using two Function Blocks (FBs) as detailed later in this QSG.

#E0H to #FFH	#224 to #255	Remote input (RX) *2	Stores the input status from a remote station and intelligent device station.	R/O
#100H to #15FH	#256 to #351	Use prohibited *1	-	-
#160H to #17FH	#352 to #383	Remote output (RY) *2	Stores the output status to a remote station and intelligent device station.	R/W
#180H to #1DFH	#384 to #479	Use prohibited *1	-	-
#1E0H to #21FH	#480 to #543	Remote registers (RWw) *2	Stores the transmission data to a remote station and intelligent device station.	R/W
#220H to #2DFH	#544 to #735	Use prohibited *1	-	-
#2E0H to #31FH	#736 to #799	Remote registers (RWr) *2	Stores the received data from a remote station and intelligent device station.	R/O

Figure 4.2.1 Remote I/O BFMs

4.3 CC-Link Master Station Buffer Memory Locations

The following shows the BFM locations that the PLC program can read from to get CC-Link Network Status.

#AH, #BH	#10, #11	I/O signals to PLC	I/O signals to control the master block	R/W

Figure 4.3.1 I/O Master BFMs

- PLC ← Master block : Read (when FROM instruction is used)

BFM No.		Bit	Input signal name
Hex.	Dec.		
#AH	#10	b0	Unit error
		b1	Data link status in master station
		b2	Parameter setting status
		b3	Data link status in other stations
		b4	Use prohibited
		b5	Use prohibited
		b6	Normal completion of data link startup by buffer memory parameters
		b7	Abnormal completion of data link startup by buffer memory parameters
		b8	
		b9	
		b10	
		b11	Use prohibited
		b12	
		b13	
		b14	
		b15	Unit ready

Figure 4.3.2 I/O Master Module Status Bits

Bits b0, b1 and b15 are used in the GX Works2 Program Example as shown in Chapter 5.

4.4 Data Transfer per Remote Station

Each Remote Station in the QSG occupies 1 Station in CC-Link V1.10 Mode.

This includes 32 RX, 32 RY, 4 RWw and 4 RWr words per station. These points are used regardless of the physical station type installed.

- Link points of remote net ver. 2 mode and remote net additional mode

CC-Link Version		CC-Link Ver. 1.10	CC-Link Ver. 2.00			
Expanded cyclic setting		-	Single	Double	Quadruple	Octuple
Occupies 1 station	bit (RX)	32 points	32 points	32 points	64 points	128 points
	bit (RY)	32 points	32 points	32 points	64 points	128 points
	word (RWw)	4 points	4 points	8 points	16 points	32 points
	word (RWr)	4 points	4 points	8 points	16 points	32 points
Occupies 2 stations	bit (RX)	64 points	64 points	96 points	192 points	-
	bit (RY)	64 points	64 points	96 points	192 points	
	word (RWw)	8 points	8 points	16 points	32 points	
	word (RWr)	8 points	8 points	16 points	32 points	
Occupies 3 stations	bit (RX)	96 points	96 points	160 points	-	-
	bit (RY)	96 points	96 points	160 points		
	word (RWw)	12 points	12 points	24 points		
	word (RWr)	12 points	12 points	24 points		
Occupies 4 stations	bit (RX)	128 points	128 points	224 points	-	-
	bit (RY)	128 points	128 points	224 points		
	word (RWw)	16 points	16 points	32 points		
	word (RWr)	16 points	16 points	32 points		

Chapter 5 GX Works2 Program Example

5.1 Initial Setup

The demo program first configures the Number of Connected CC-Link Remote Modules (4) and the Head Address of the Master Module (0). Also the Master Status Bits are read From the Master to the PLC program. These are held in M20 through M35. M20, M21 and M35 are used in the demo program.

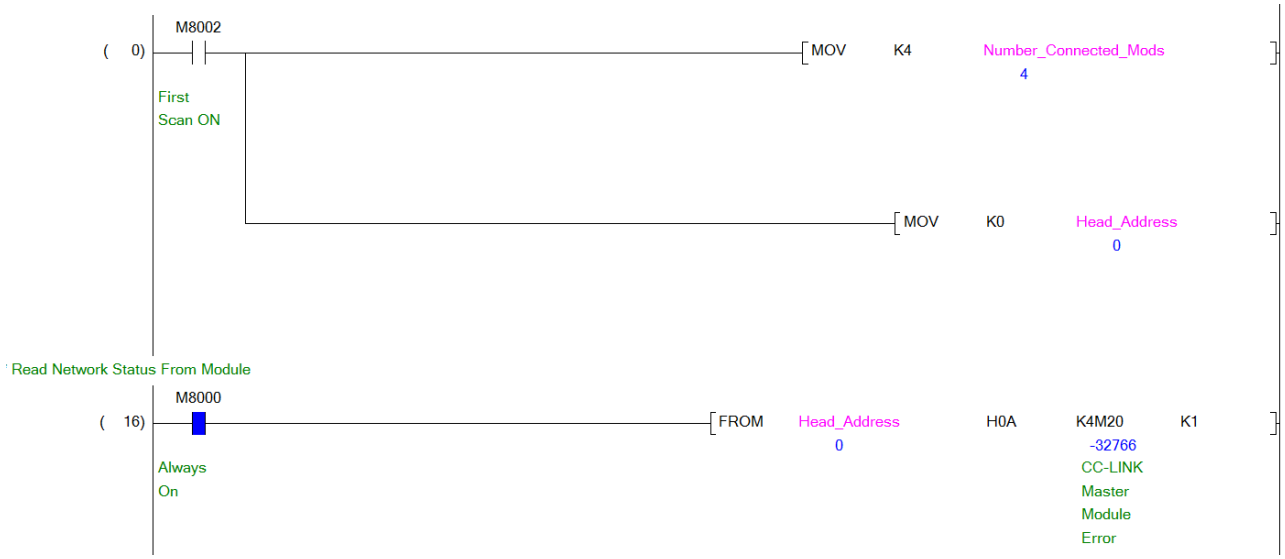


Figure 5.1 Initial Code Setup

M20 = Master Module Error (Off = Good)

M21 = Datalink Status of Master (ON = Good)

M35 = Master Module Read (ON = Good)

5.2 I/O and Data Word Transfer Function Blocks (FBs)

Two FBs were created to transfer Digital I/O and Data Words to and from the network.

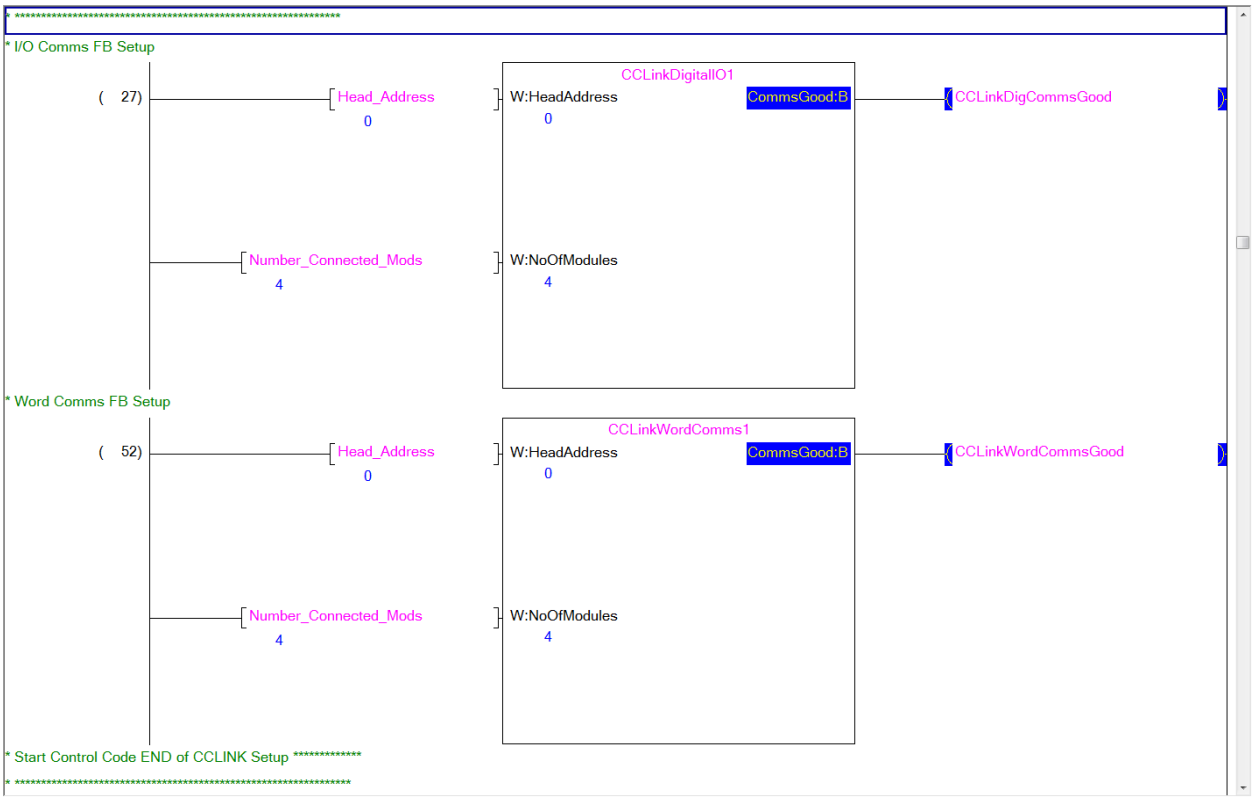


Figure 5.2.1 Digital I/O and Data Word Transfer Function Blocks in PLC Code

Both Function Blocks require a Head Address and Number of Connected Modules data inputs as defined in the Initial Setup. Both have Communication Status Outputs that can be used as interlocks as needed.

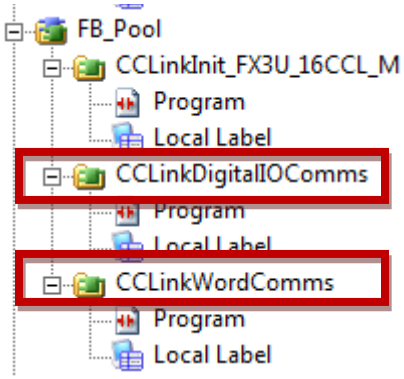


Figure 5.2.2 Digital I/O and Data Word Transfer Function Blocks under FB_Pool in Project Manager

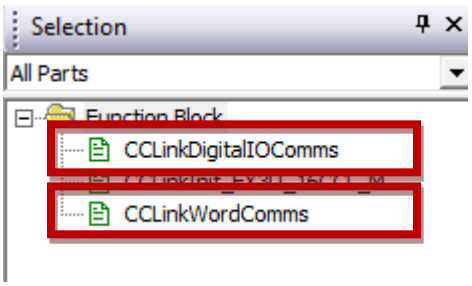


Figure 5.2.3 Digital I/O and Data Word Transfer Function Blocks in Function Block Selection Window

The CCLinkDigitialIOComms Function Block transfers 32 bits of data to and 32 bits of data from each Remote I/O Station starting at M1000 for Remote Inputs and M2000 for Remote Outputs.

For Station #1 (16 Point Input) M1000 thru M1031 are used. (RX)

For Station #2 (16 Point Output) M2032 thru M2063 are used. (RY)

For Station #3 (2DA) M1064 thru M1095 are used (RX) and M2064 thru M2095 (RY) are used.

For Station #4 (4AD) M1096 thru M1127 are used (RX) and M2096 thru M2127 (RY) are used.

Even though there are no Outputs being physically used for Station #1, 32 points of RYs are still used.

Even though only 16 physical inputs are being used for Station #1, 32 points of RXs are still used.

Refer back to Section 4.4 for map of RX, RY, and RWr and RWw data.

The CCLinkWordComms Function Block transfers 4 words of data to and 4 words of data from each Remote Station starting at D1000 for Remote Inputs and D2000 for Remote Outputs.

For Station #1 D1000 thru D1003 are used (RWr) and D2000 thru D2003 are used (RWw)

For Station #2 D1004 thru D1007 are used (RWr) and D2004 thru D2007 are used (RWw)

For Station #3 D1008 thru D1011 are used (RWr) and D2008 thru D2011 are used (RWw)

For Station #4 D1012 thru D1015 are used (RWr) and D2012 thru D2015 are used (RWw)

Even though there are no RWr and RWw being physically used for Station #1 and #2, the data words are still used by these stations.

Refer back to Section 4.4 for map of RX, RY, and RWr and RWw data.

5.3 Remote Analog Module Setup

In the MAIN program when Remote Input 1 (M1000) goes ON it SETS the Enable Analog Output Bit (M10) and then 1 second later it SETS the Enable Analog Input Bit (M110

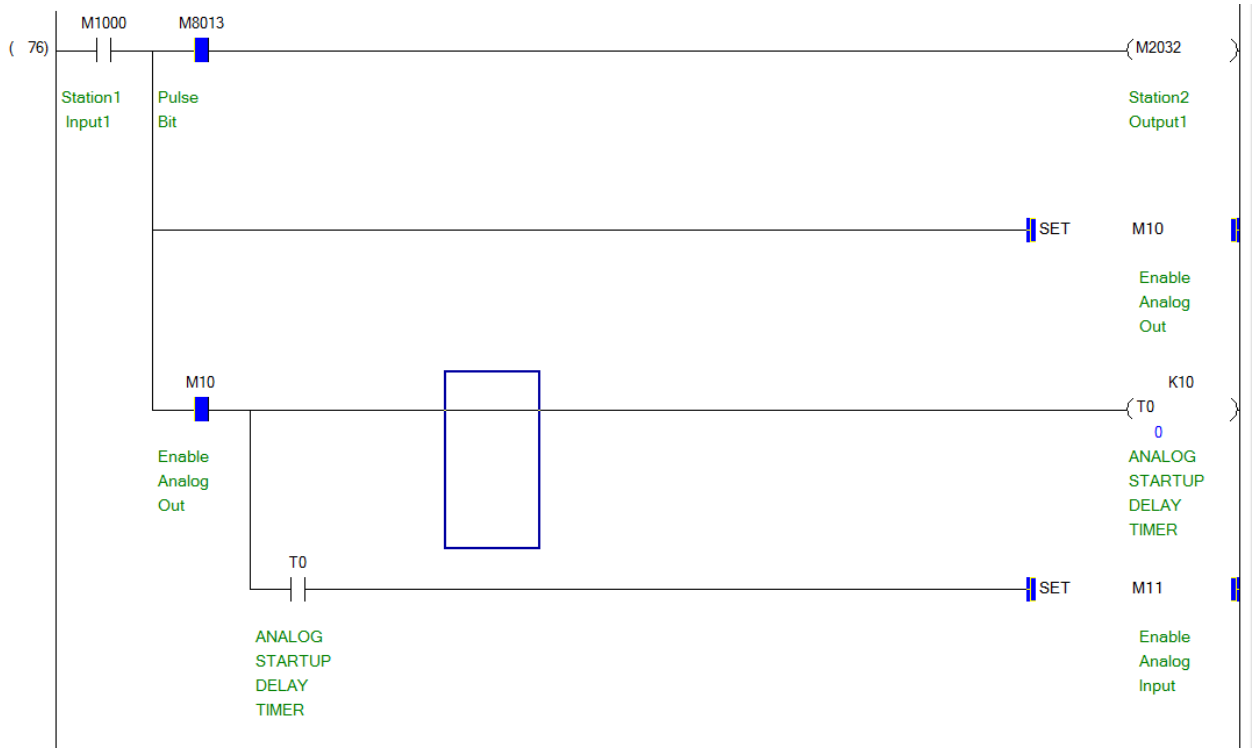


Figure 5.3.1 MAIN Program Detail for Analog Setup

In the ANALOG program the first section initiates the 62DA Module then enables Output Channel 1.

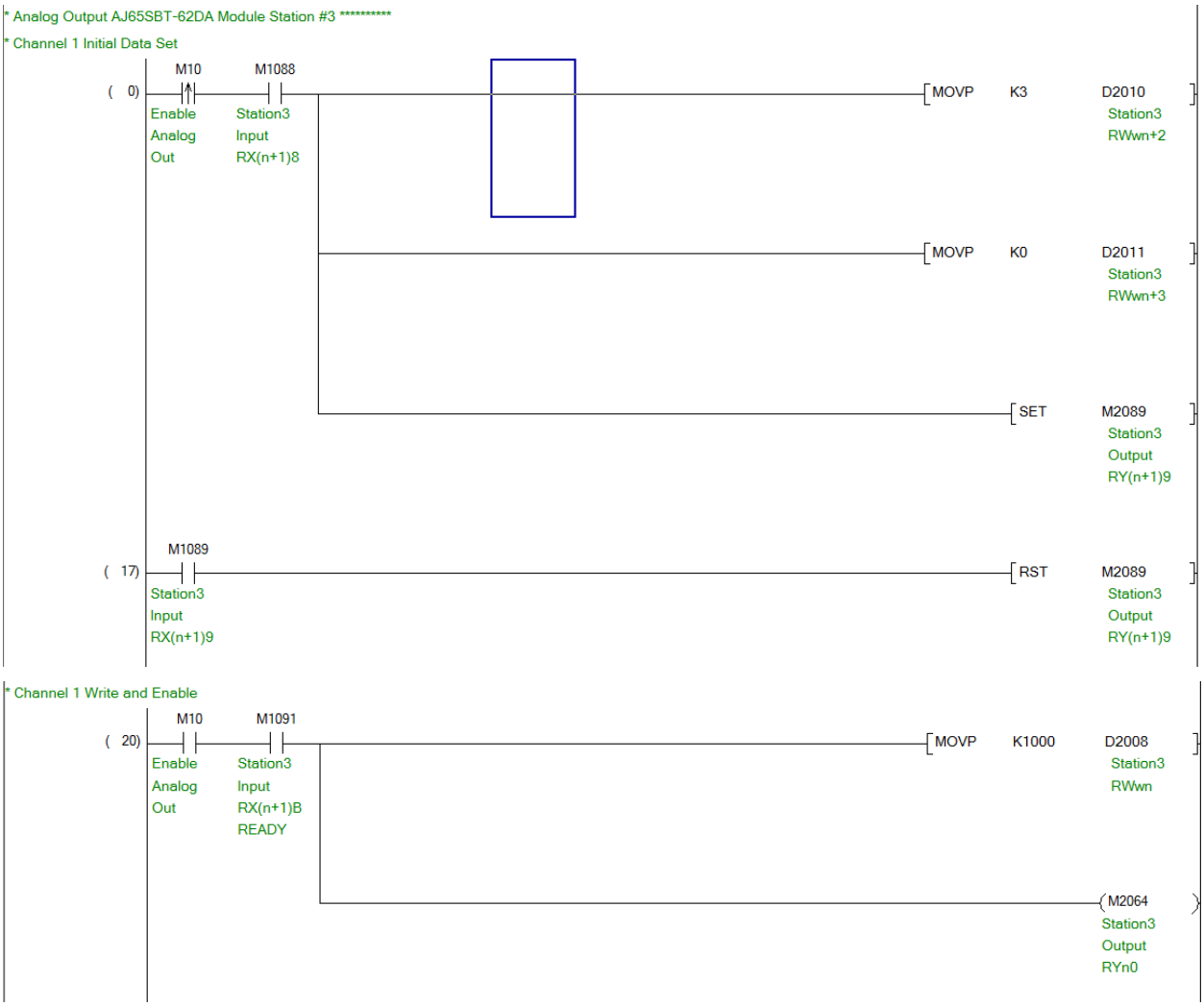


Figure 5.3.2 62DA Module Initialization and Enable

The 62DA Module uses the following RX/RY and RWr/RWw

Signal Direction: AJ65SBT-62DA → Master Module		Signal Direction: Master Module → AJ65SBT-62DA	
Remote input (RX)	Name	Remote output (RY)	Name
RXn0 to RXnB	Reserved		
RXnC	E^2PROM write error flag	RYn0	CH.1 analog output enable/disable flag
RXnD	Reserved		
RXnE			
RXnF	Test mode flag	RYn1	CH.2 analog output enable/disable flag
RX (n+1) 0 to RX (n+1) 7	Reserved	RYn2 to RY (n+1) 7	Reserved
RX (n+1) 8	Initial data processing request flag	RY (n+1) 8	Initial data processing complete flag
RX (n+1) 9	Initial data setting complete flag	RY (n+1) 9	Initial data setting request flag
RX (n+1) A	Error status flag	RY (n+1) A	Error reset request flag
RX (n+1) B	Remote READY	RY (n+1) B to RY (n+1) F	Reserved
RX (n+1) C to RX (n+1) F	Reserved		

Figure 5.3.3 62DA Module RX/RY I/O Points

M1088 = RX(n+1)8 (Initial Data Processing Requested)

M1089 = RX(n+1)9 (Initial Data Setting Complete)

M1091 = RX(n+1)B (Remote Ready)

M2089 = RY(n+1)9 (Initial Data Setting Request)

M2064 = RYn (CH1 Analog Out Enable)

Transfer Direction	Address	Description	Default Value	Refer to
Master → Remote	RWwm	CH. 1 digital value setting	0	Section 3.6.2
	RWwm+1	CH. 2 digital value setting	0	
	RWwm+2	Analog output enable/disable setting	0	Section 3.6.3
	RWwm+3	Output range/HOLD/CLEAR setting	0	Section 3.6.4
Remote → Master	RWm	CH. 1 check code	0	Section 3.6.5
	RWm+1	CH. 2 check code	0	
	RWm+2	Error code	0	Section 3.6.6
	RWm+3	Reserved	0	—

Figure 5.3.4 62DA Module RWw and RWr Data Points

D2008 = RWw (Analog Out Value)

D2010 = RWw2 (Analog Enable)

D2011 = RWw3 (Output Range)

In the ANALOG program the second section initiates the 64AD Module then Reads Input Channel 1.

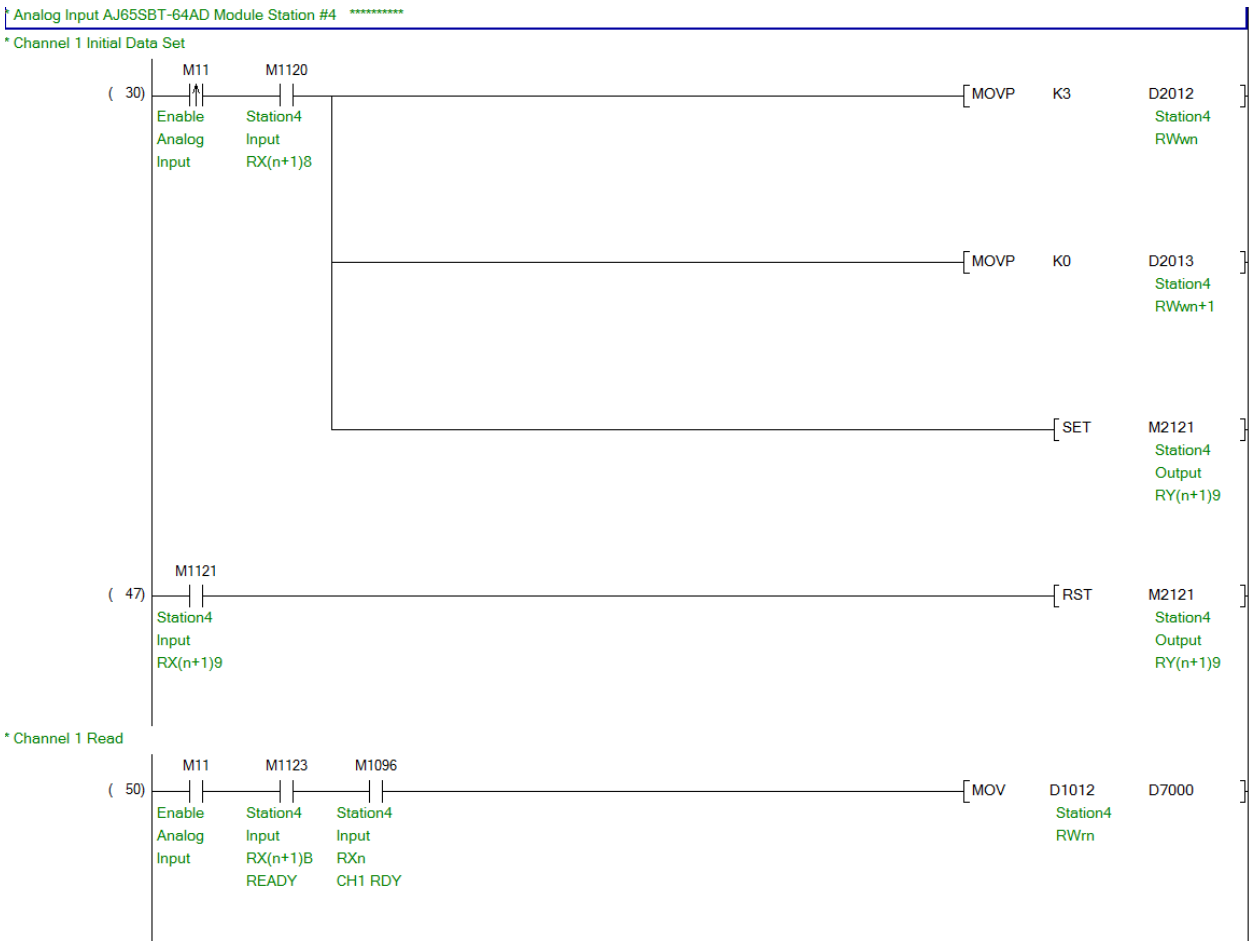


Figure 5.3.5 64AD Module Initialization and Enable

The 64AD Module uses the following RX/RY and RWr/RWw

Signal direction: AJ65SBT-64AD → Master Module		Signal direction: Master Module → AJ65SBT-64AD	
Remote input (RX)	Signal name	Remote output (RY)	Signal name
RXn0	CH.1 A/D conversion completion flag	RYn0	CH.1 moving average processing specifying flag
RXn1	CH.2 A/D conversion completion flag	RYn1	CH.2 moving average processing specifying flag
RXn2	CH.3 A/D conversion completion flag	RYn2	CH.3 moving average processing specifying flag
RXn3	CH.4 A/D conversion completion flag	RYn3	CH.4 moving average processing specifying flag
RXn4	CH.1 range error flag	RYn4 to RY(n+1)7	Reserved
RXn5	CH.2 range error flag		
RXn6	CH.3 range error flag		
RXn7	CH.4 range error flag		
RXn8 to RXnB	Reserved		
RXnC	E^2PROM write error flag		
RXnD	Reserved		
RXnE			
RXnF	Test mode flag		
RX(n+1)0 to RX(n+1)7	Reserved		
RX(n+1)8	Initial data processing request flag	RY(n+1)8	Initial data processing completion flag
RX(n+1)9	Initial data setting completion flag	RY(n+1)9	Initial data setting request flag
RX(n+1)A	Error status flag	RY(n+1)A	Error reset request flag
RX(n+1)B	Remote READY	RY(n+1)B to RY(n+1)F	Reserved
RX(n+1)C to RX(n+1)F	Reserved		

Figure 5.3.6 64AD Module RX/RY I/O Points

M1120 = RX(n+1)8 (Initial Data Processing Requested)

M1121 = RX(n+1)9 (Initial Data Setting Complete)

M1123 = RX(n+1)B (Remote Ready)

M2121 = RY(n+1)9 (Initial Data Setting Request)

Communication direction	Address	Description	Default value	Reference section
Master → Remote	RWwm	A/D conversion enable/prohibit specification	0	Section 3.6.2
	RWwm+1	Input range setting	0	Section 3.6.3
	RWwm+2	Moving average processing count setting	0	Section 3.6.4
	RWwm+3	Reserved	0	——
Remote → Master	RWm	CH.1 digital output value	0	
	RWm+1	CH.2 digital output value	0	Section 3.6.5
	RWm+2	CH.3 digital output value	0	
	RWm+3	CH.4 digital output value	0	

Figure 5.3.7 64AD Module RWw and RWr Data Points

D2012= RWwn (Analog Enable)

D2013 = RWw(n+1) (Input Range)

D1012 = RWr (Analog Input CH1 Value)

Chapter 6 Other Master Features

6.1 Remote Slave Access Using FX3U-64CCL Modules and GX Works2 Software

Remote Access is setup through the Connection Destination Menu Manager

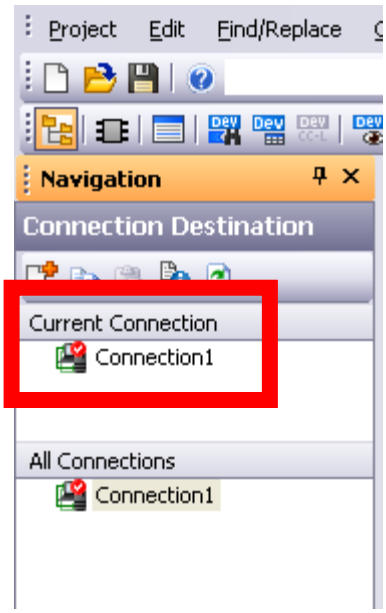


Figure 6.1 Connection Destination Example

First Select “Serial/USB” in the PC side I/F then Select “Other Station (Single Network)”

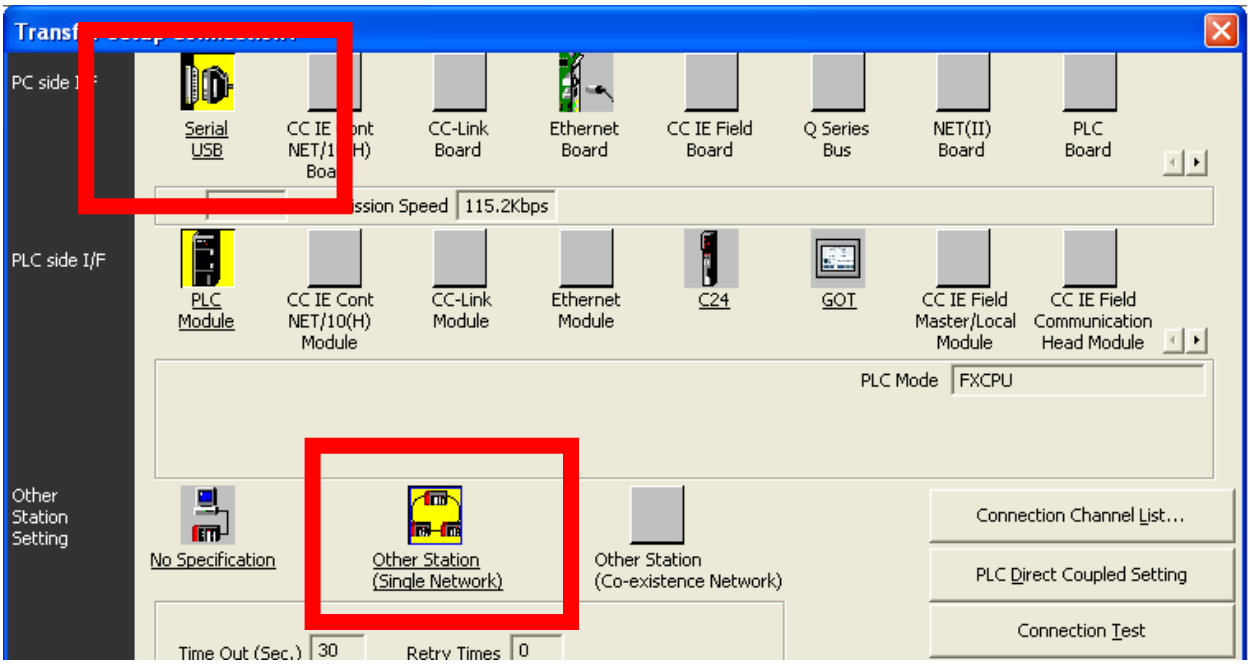


Figure 6.1.2 Select “Other Station” from Other Station Setting Menu

Select “CC-Link” from Network Communication Route

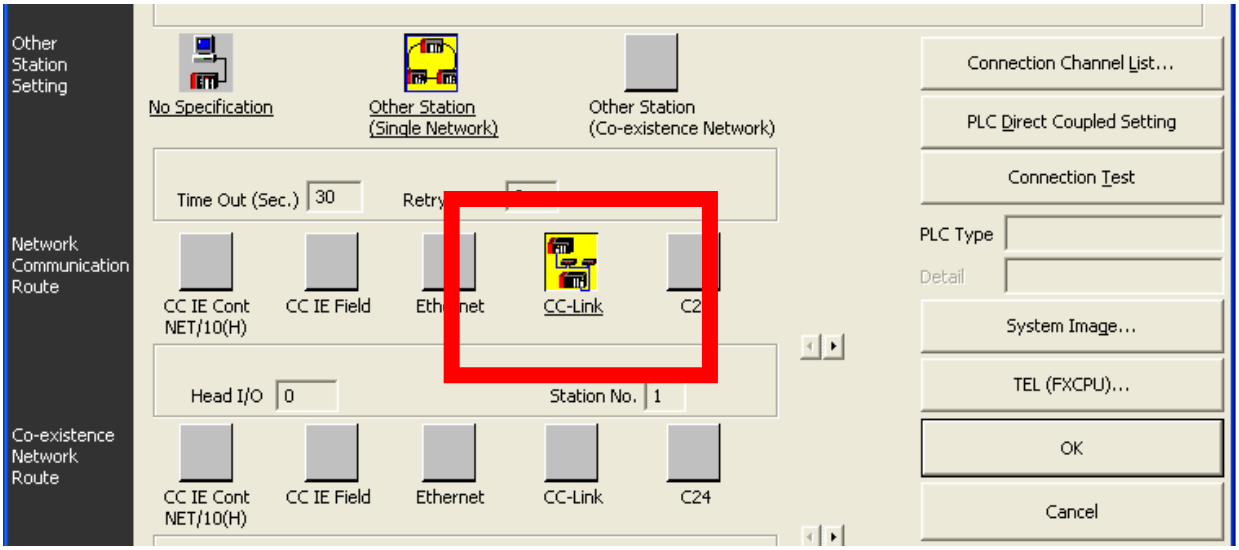


Figure 6.1.3 Select “CC-Link” from Network Communication Route Menu

Input Head I/O number for the FX3U CC-Link Master and the Station Number of the Intelligent Device Station you want to program. Finally select “OK” and do Connection Test from the Transfer Setup Main Menu.

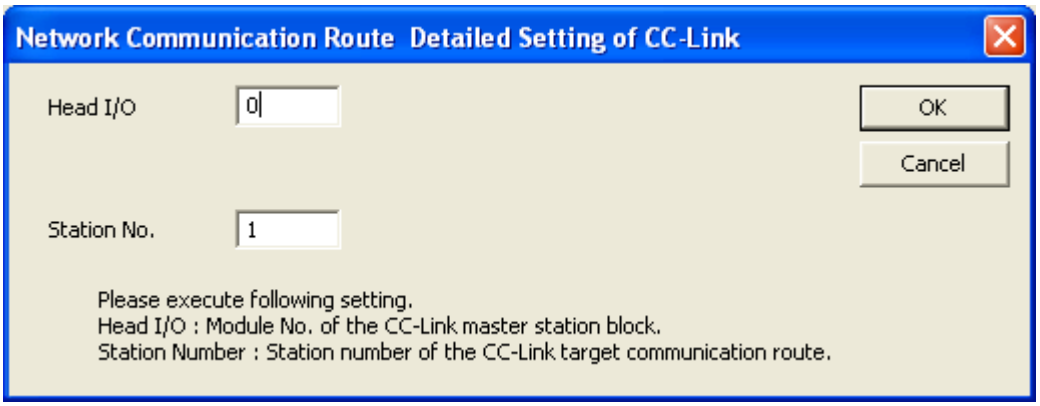

Network Communication Route Detailed Setting of CC-Link
Head I/O
0
OK
Cancel
Station No.
1
Please execute following setting.
Head I/O : Module No. of the CC-Link master station block.
Station Number : Station number of the CC-Link target communication route.

Figure 6.1.4 Select CC-Link Head I/O and Intelligent Station Number

6.2 Remote Device V2.0 Support

Version 2.0 Remote Devices or Intelligent Device Stations can be access by setting the Remote Stations Switch Settings properly. This is an example of setting the FX3U-64CCL for V2.0 support. 2 Stations with Double expanded cyclic support.

Setting	Number of occupied stations	Expanded cyclic setting*1	Master station setting
0	1 station	Single	Please set up as a Ver.1 intelligent device station.
1	2 stations	Single	
2	3 stations	Single	
3	4 stations	Single	
4	1 station	Double	Please set up as a Ver.2 intelligent device station.
5	2 stations	Double	
6	3 stations	Double	
7	4 stations	Double	
8	1 station	Quadruple	
9	2 stations	Quadruple	
A, B	Unusable	Unusable	-
C	1 station	Octuple	Please set up as a Ver.2 intelligent device station.
D to F	Unusable	Unusable	-

Figure 6.2 FX3U-64CCL Switch Setting Example

Version 2.0 Remote Device or Intelligent Device Stations can be setup in CC-LINK Station Information as needed. This is an example of setting the FX3U-64CCL for V2.0 support

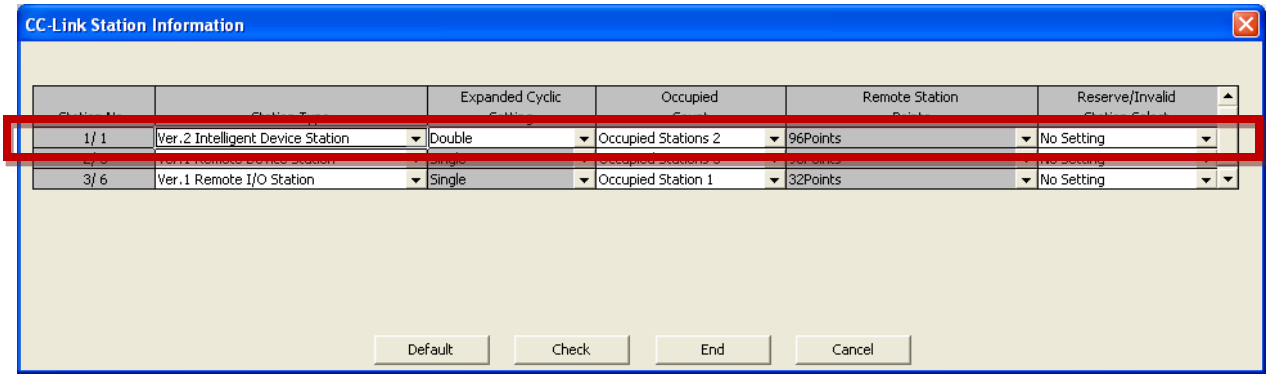


Figure 6.2.1 FX3U-64CCL Station Setting Example

Revisions

February 2012 – Document Created and Published V1.0